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ABSTRACT

A project involving prospective social studies teachers as collaborators in an experimental investigation is described. The study was undertaken as part of the course requirements for an integrated educational psychology/secondary methods course. The course was intended to ameliorate the fragmentation of the coursework and lack of coherence between theory and practice in the teacher preparation program. Students were required to participate in a novice-assisted investigation. They selected the effect of using advance organizers to improve student retention as their topic and chose to replicate a study of the spacing effect by J. Glover and others (1990). The student-conducted study examined the use of advance organizers for 450 middle school students. Outcomes of the research project indicate that novices (the prospective teachers) can become critical consumers of knowledge about teaching, and they are capable of acquiring the knowledge and skills to do competent research. Also noteworthy was that they did not change their orientation toward attaching more credibility to the advice of practicing teachers and the "pure application" literature than to the theoretical and empirical sources for information on best practice. (SLD)

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Novice-assisted research as a means of promoting inquiry into the relationship between instructional theory and practice.

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This paper reports on a project involving prospective social studies teachers as collaborators in an experimental investigation. The study was undertaken as part of the course requirements for an integrated educational psychology/secondary methods course. The purpose of the project was to promote student inquiry into the relationship between instructional theory and practice. The paper is organized into four parts: (1) a description of the merged educational psychology/secondary methods course in which the study was undertaken, (2) a report of the procedures and findings of the novice-assisted investigation, (3) an account of the students' efforts to reflect on the relationship between theory and practice, and (4) an assessment of the promises and pitfalls of the project.

Setting for the Study

The study was conducted as an integral part of a merged educational psychology/secondary methods course. The course was created to ameliorate two shortcomings of the teacher preparation program: fragmentation of the coursework, and a lack of coherence between theory and practice. The merged course integrated the learning and developmental theory from the educational psychology course with the instructional strategies and techniques of the secondary methods course.

The theme for the merged course- the teacher as decision-maker- is taken from the institution's NCATE knowledge base. The course is inquiry-oriented. Students examine a variety of issues including the implications of cognitive and behavioral learning theories for teaching social studies, the relative merits of expository and inquiry-discovery teaching paradigms, and the promises and pitfalls of discipline-based social studies instruction. Other features include a field-based component planned in collaboration the faculty and staff at a local middle school, adherence to quality learning principles, the demonstration of six instructional models: inquiry, guided discovery, direct instruction, case study, and cooperative team learning strategies. During their internships students design and teach lessons employing the theories and instructional models demonstrated in the course (Ferguson and Salmeri, 1992). This paper discusses an additional key feature of the course- the requirement that students participate in a novice-assisted investigation.

The Novice-Assisted Research Project.

Following a study of the terms "theory" and "research" and their role in the creation of a knowledge base for teaching the students were directed to select a topic for a team-based investigation. The problem they elected to study had to meet certain criteria. It had to: address an instructional problem that emerged from their classroom visitations, be a topic which appears in both the educational psychology and social studies literature, have been the subject of at least three previous investigations, be amenable to investigation through the use of an experimental design, and be researchable at the middle school internship site.

Following a discussion on the merits of several possible topics, the students agreed that the sixth and seventh grade students were having difficulty retaining and applying the material from previous lessons. They examined their educational psychology textbook and other sources and identified Ausubel's theory of reception learning as having potential for alleviating the problem. After further discussion it was decided to restrict the investigation to a study of the effect of employing advance organizers (AOs) to improve student retention. They were able to locate several studies on the subject and chose to replicate a study of the "spacing effect" by Glover, Bullock and Dietzer, (1990). With the instructor's assistance, the students designed and carried out the investigation described in the next section.

The Spacing Effect Study

Statement of the Problem Research indicates that the use of AOs improves the learning of verbal material (Corkill, Glover, Bruning and Krug, 1989; Dellarosa, 1988; Lutien, Arnes, and Ackerson, 1980; Mayer, 1979; Martorella, 1990; Slater, Graves and Piche, 1985; Stone, 1983). Of the large number of studies conducted, only a few have investigated the most effective use of AOs. Several studies found an improved effect when a delay strategy is introduced (Dellarosa and Bourne, 1985; Dempster, 1988; Glover, Bullock and Dietzer, 1990). The study reported here replicated an investigation of the "spacing effect hypothesis" by Glover, Bullock and Dietzer, (1990). This theorem states that the learning of verbal material is superior when encoding trials are distributed rather than massed (Glover, Bullock and Dietzer, 1990).

Procedure. The study took place in a middle school consisting of grades 6, 7, and 8 and containing a population of 450 students. The design entailed selecting two pairs social studies classrooms, one pair at the sixth, the other at the seventh grade level. The selected classes were randomly assigned control and experimental group status. Each pair of classes was taught by the same teacher. The teachers participated in three one-hour training sessions on Ausubel's theory of reception learning collboratively taught by the instructor and the methods course students. Ninety-six sixth and seventh graders were randomly assigned to one of three conditions: (1) read only control, (2) organizer and immediate text reading and (3) organizer and five-minute delay prior to reading text. A 94-word advance organizer prepared by Glover, Bullock and Dietzer, 1990 and conforming to Ausubel's (1968) criteria was distributed and read to the two groups of experimental students. The subject of study was the San Francisco earthquake. The organizer and immediate text reading groups were given five minutes to listen to and then paraphrase the organizer at the bottom of the page followed by an immediate reading of a passage by Jack London describing the earthquake. Students in the second experimental group were given and additional five minutes of unsupervised time. Sentences from the subjects' protocols were analyzed into idea units and scored by three raters. The number of idea units that they recalled from the essay (k = .88) was computed. The averages of the two raters scores were

then entered into a one-way analysis of variance (ANOVA) with conditions as the independent variable and number of ideas units recalled as the dependent variable). The Tukey procedure (alpha = .05) was employed to test for significant differences among the three conditions.

Findings. A statistically significant difference ($F = 18.42$, $p < .01$, $MS_e = 7.98$) was found in favor of the students who had received instruction utilizing AOs. Moreover, students in the "delay condition" outperformed those in either the immediate or control groups denoting a further benefit to introducing a delay between the time the organizer is presented and students' exposure to the substantive material for the lesson. These findings are consistent with the previous research on the "spacing effect" hypothesis (Dellarosa and Bourne, 1985; Dempster, 1988; Glover, Bullock and Dietzer, 1990).

This report was published by the students and shared with the middle school faculty.

Debriefing the Experience

As mentioned earlier, the terms "theory" and "research" and their role in the development and verification of a knowledge base for teaching had been discussed in a unit on the nature and practice of educational psychology at the beginning of the course. Upon completion of the study the students participated in a videotaped seminar in which they were encouraged to use this information to reflect upon the study's contribution to the knowledge base of teaching[1].

Supporting Reactions. The majority of the students felt that the study was sound and that it made a worthwhile addition to the existing research by demonstrating the positive effect of AOs on the learning of social studies material for this particular age level in a small town/rural school setting.

With reference to the theory being tested, all except one of the students agreed that Ausubel's theory of receptive learning, in which the use of AOs is an integral part, met all of Patterson's (1977) criteria for a "good theory." In their judgement it was: precise, simple, comprehensive, testable, empirically verifiable, practical, significant rather than trivial, widely accepted by scholars, and applicable to a wide variety of settings.

The students conceded that initially Ausubel's theory of receptive learning had not made much of impression on them. Participation in the study had elevated its relevance in their minds, in particular the efficacy of introducing AOs in situations where it was important for students to retain verbal material. Most were further

convinced that the use of a spacing strategy was important for achieving a maximum effect.

Dissenting Reactions. One student observed that the study had not paid close attention to several basic tenets of Ausubel's theory, that is that AOs must: be related to an anchoring idea that the students already possess, be at a slightly higher level of abstraction, relate to material that is potentially meaningful, entail a scaffolding for the new information to be learned, and relate to the individual student's schemata. In keeping with the study being replicated, he noted that by those standards our study invoked the use of a relatively unrefined "global" AO remarking that no serious attempt had been made to match the level of abstraction to the students' abilities or to their personal frames of reference. Several students responded that they felt it was safe to assume that the sixth and seventh graders in our study had adequate frames of reference for the study of earthquakes and that it wasn't necessary to determine this before the fact.

Several commented that a number of variables which could have effected the outcome of the study- teachers personalities, time of the day, student characteristics, previous knowledge of the topic; were not measured or controlled. This led to a discussion about whether the laboratory model of research used in the hard sciences was appropriate for the study of classroom behavior. As a group, history majors appeared to be more critical of the scientific validity of the study than the social science majors.

Two of the students had reservations about what the study had accomplished. They wondered why we had tested something that, in the words of one student, "was just plain common sense." To them it stood to reason that teachers ought to introduce lessons by relating the material to students frames of reference and informing them of the goals and structure of the day's lesson. One student countered: "If AOs were merely common sense, why didn't the more experienced middle school teachers use them more in their teaching."

Another student commented that he didn't think the study had tested theory at all- merely one minor component of Ausubel's model of receptive learning. This was countered with the statement: "Isn't that how scientists work? For instance, in trying to define a unified theory of the universe, research physicists must study a myriad of problems one at a time."

Several of the students felt that our study was not very powerful because it failed to truly explain why students in the "delay condition" outperformed students in both the immediate and control groups. They alluded to an earlier discussion of George Homan's notion that good social science research is that which yields insight

into the why of human behavior not just the what. The explanation of previous researchers that the spacing effect worked because of the positive benefits of distributed over massed practice really just begged an explanation of why distributed practice was more effective in the first place. Someone commented that whatever the study had concluded one could always ask another why question- what one student referred as a "never ending search for first causes." One student thought all of this was academic and commented: "Let's get real, as long as it works, teachers don't have to worry about why it works."

One student noted that Ausubel believes that meaningful learning involves thinking, the use of comparisons, the search for similarities and differences but that our study had only been concerned with verbatim recall. Could we have designed an AO that would have facilitated a thinking activity? One student thought that the extensive time and effort given to this study might have been better utilized to investigate a more meaningful topic such as cooperative learning or a more effective method of teaching by the inquiry method.

Other reactions. One student wondered why most of the teachers in the school were poorly informed not only about this topic but about any of the research on teaching. Even the teachers' high level of concern about the students' inability to retain material had not prompted them to consult the research literature. Most agreed that it was probably not very realistic to expect teachers to consult the theoretical or research literature given the demands on their time and the inaccessibility of sources. Nevertheless most concurred that if teachers spent time reading the research they would be stimulated to reflect more on their own teaching and experiment with new ideas. Students also felt that knowing something about the research process would make teachers more inclined to take a more "scientific approach" to evaluating learning and in deciding upon teaching methods rather than simply using their intuition. This led to a discussion of the role that research might play in helping teachers make decisions about competing theories of instruction. Could any of the evidence from this study help teachers decide whether Ausubel's theory of expository teaching was in any way superior to its counter theory- Bruner's theory of guided discovery? From the reading they had done it seemed that both Ausubel's theory of reception learning and Bruner's theory of guided discovery had an extensive research base, yet Bruner's ideas appeared to get considerably more attention in the social studies literature. This led to a discussion of how personal philosophies of education influence preferences among learning theories and that perhaps Bruner's ideas were more in keeping with the beliefs of those who wrote the textbooks and journal articles.

Discussion then ensued regarding whether or not a teaching method had to pass the test of empirical verification before it could be considered within the realm of "best practice." Nearly all of the students conceded that if a teaching technique

interested them they would probably not be very concerned with whether or not it had an adequate research base. One student cited the example of an article she had just read on using metaphors in the classroom (Mahood, 1987). She was intrigued by it and had already written a lesson plan for the practicum component of the course. She admitted that she had not looked to see if there was any research on teaching metaphors but in any case said that was likely to judge its effectiveness from on her own experience not on what the research said.

Course Outcomes

In addition to their seminar responses to the research project, the students' discernment of the implications of theory and research for practice was assessed through pre and postcourse evaluations. The small, unequal sizes of the groups and the infeasibility of randomly assigning students to classes obviated the use of a proper experimental design. With this limitation in mind, the findings reported in Table 1 indicate that the research experience and the course in general had a mixed effect on the students[2].

TABLE 1. Differences in Mean Ratings on Pre and Post Course Responses

Course Outcome	Merged Course	Separate courses
Perceived understanding of the link between theory and classroom teaching	+31	+11
Perceived understanding of the link between research and classroom teaching	+28	+6
Confidence that theory has promise for improving the teaching of social studies	+15	+14
Confidence that research has promise for improving the teaching of social studies	+5	+9

Perceived understanding. Students in both the merged and separate courses increased in their perceived understanding of the connections between theory, research and classroom teaching. Students in the merged course increased their

insight to a somewhat greater degree than those in the stand-alone courses. Since greater attention to theory and research had occurred in the merged course this outcome was not surprising.

Confidence. The results indicating only small gains in the students' confidence in theory and research as sources for improving practice were not anticipated. Perhaps the fact that students in the merged course had examined rather merely received information about research on teaching offers some explanation. As the students delved into the research on such topics as the effects of class size, tracking, inquiry strategies, retention, and cooperative team learning on student achievement they became less and less sanguine about the prospects of research for informing practice. For one student, the discovery of countervailing studies on almost every topic he investigated prompted him to observe that this seemed to demonstrate the truth of a statement he had recently read by Also contributing to the students' skepticism was the fact that many were not overly impressed with the quality of the research they uncovered, particularly in social studies education.

At the end of the course the students in the merged course continued to attach greater credence to the advice of experienced teachers and "pure application" articles as sources for improving their teaching; without much concern for their theoretical and empirical legitimacy. Of the four sources rated by the students, the advice of experienced teachers received the highest rating (85), practical, how to do it articles such those appearing in the "Classroom Teacher's Idea Notebook" series in Social Education ranked second (67), sources on theoretical models and strategies was third (52), and the research literature ranked fourth (38).

Implications

The rationale for this project was derived from an emerging literature which views teachers as generators and coproducers, not merely the consumers of research on teaching (Kaestle, 1993; Lytle and Cochran, 1992; Lampert, 1985). Preparing novices for this new role entails educating prospective teachers according to a different theory of knowledge for teaching, an epistemology which regards inquiry by teachers themselves as a distinctive and important way of knowing about teaching. Lytle and Cochran-Smith (1992) refer to this as attaining expertise in the construction of "capital K knowledge-" knowledge produced and used by teachers in their local school environments.

In keeping with views of Grossman (1992), and in contrast to the views of those who believe that prospective teachers are not yet ready to reflect on the nature of pedagogical knowledge (Berliner, 1988; Kagan, 1992), the outcomes of this project indicate that novices can become critical consumers of knowledge about teaching and that they are capable of acquiring the knowledge and skills to do competent research.

The project outcomes also suggest that when novices are asked to critically examine rather than merely receive the existing research they take on a somewhat skeptical view. Also noteworthy is the fact that they did not change their orientation toward attaching more credibility to the advice of practicing teachers and the "pure application" literature than to the theoretical and empirical sources for information on "best practice." The reader is left to judge whether these were desirable outcomes.

Notes

[1]The debriefing seminar was videotaped. To get a sense of the group, students were asked for a show of hands to indicate agreement or disagreement on each of the issues discussed in the session.

[2]The students enrolled in the merged and the separate educational psychology and secondary methods courses were asked to grade themselves on a scale of 0 to 100 with regard to the following items.

1. The score that reflects my understanding of the link between THEORY and classroom teaching is _____.

2. The score that reflects my understanding of the link between RESEARCH and classroom teaching is _____.

3. The score that reflects my belief that THEORY has promise for improving the teaching of social studies is _____.

4. The score that reflects my belief that RESEARCH has promise for improving the teaching of social studies is _____.

Students were also asked to rate on a scale of 0 to 100 the importance they would attach to each of the following as sources for the improvement of their own teaching.

_____ 1. Instructional/learning theories for teaching social studies in books and journals.

_____ 2. Research on the teaching of social studies.

_____ 3. Practical (how to do it) articles on specific teaching techniques- even if they are not related to any particular theory or research.

_____ 4. The recommendations of experienced teachers who were considered to be excellent teachers of the subject- even if they do not make reference to any particular theory or research.

To prevent misinterpretation of the terms "theory and "research," pretest responses were not collected until after the introduction to theory and research at the beginning of the educational portion of course. The postassessment responses were collected during the last week of the semester.

The gain scores for each the merged versus separate course groups are the average difference in scores between the pre and postassessments.

There were 15 students enrolled in the merged course and 16 in the separate course group. The group were equivalent with regard to grade point average, amount of coursework completed, and distribution of history and social science majors. The merged course had a larger number of non-traditional (age 25 or above) students than the separate group. One limitation of the course assessment was that the merged course and stand alone methods courses were taught by two different instructors.

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